

THE *AMPHINEMURA VENUSTA* COMPLEX
OF WESTERN NORTH AMERICA
(PLECOPTERA: NEMOURIDAE)

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ABSTRACT: The *Amphinemura venusta* complex of Western North America contains six species where only one was previously recognized. A comparison of the *Amphinemura venusta* (Banks) holotype female with available specimens led to the re-definition of this species. The male of *A. venusta* is described and the species is recorded from Mexico, with the type locality in Southern Arizona being the northern limit of distribution. Two species, *A. mexicana* and *A. puebla* are described from near Mexico City. The material from the Rocky Mountains called *A. venusta* (Banks), as a result of the Needham and Claassen monograph (1925), is given the name *A. banksi*. Two species are named from Southwestern United States: *A. apache* and *A. mogollonica*.

The species in the complex are apparently restricted to permanently running waters. In the United States, the flight period is short, extending from July to September. The data available for Mexican species indicate that the emergence period is enlarged and may extend throughout the year.

Members of the genus *Amphinemura* occur throughout the Holarctic and Oriental regions (Illies, 1965). This study deals with a species complex found in the Western United States and Mexico. The complex is characterized by its peculiar "windowed" forewings. This type of wing, darkly infuscated with numerous clear spots in the cells (Fig. 1), is also present in some nemourids from the Himalayas. The included species represent the only North American species possessing this characteristic. Until now, these species were all included under the specific name *Amphinemura venusta* (Banks). The range of *A. venusta* was recorded by Ricker (1952) as extending from the Rocky Mountains in Wyoming to the mountains around Mexico City. This study, which was begun as part of a doctoral thesis by the senior author (1970), delineates this distributional pattern using the six species presently known in the complex.

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Amphinemura apache Baumann and Gaufin, new species

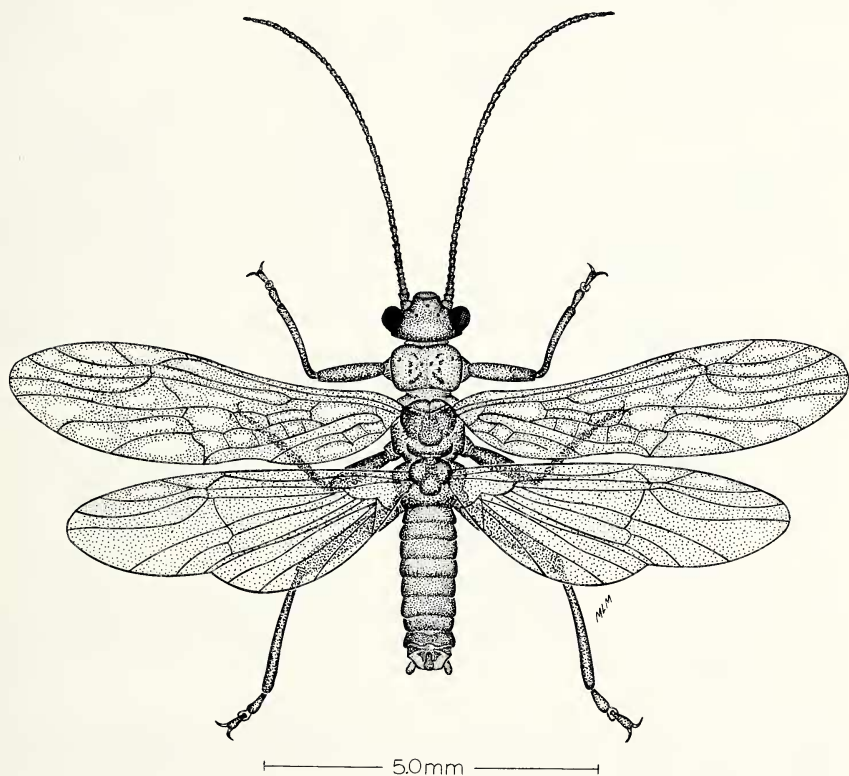
Figures 2-5

Male.—Macropterous. Length of forewings 6.0-6.5 mm; length of body 4.5-5.5 mm. Body brown; legs yellowish brown, femora dark at tip, tibiae dark at base. Forewings dusky brown with 35-40 clear rounded spots in cells distributed regularly over surface; hindwings uniform dusky brown, except for 1-2 clear spots in costal space. Ninth abdominal tergite produced at posterior margin into blunt raised knob, bearing stout dark spinules. Subgenital plate rounded, broad at base, tapering gradually to narrow tip, extending to base of epiproct; lobe at base of 9th sternite four times as long as broad, lateral margins slightly sinuate, tip rounded. Paraprocts with three sclerotized processes; inner process narrow, tip blunt, lying alongside and extending slightly beyond tip of subgenital plate; middle process with large broad base, tapering abruptly to narrow tip, bearing rows of 16-18 stout spines on anterior third; outer process long and very thin, bearing 2-4 stout spines at tip (Fig. 4). Epiproct large and mostly membranous; dorsal aspect rectangular, with deep narrow sclerotized slit at bilobed tip; lateral aspect narrow at base, becoming increasingly larger, ending in large bulbous tip, lateral sclerotized band very narrow, anterior half as dark line; ventral aspect with sclerotized plate, broad at base, lateral margins sinuate, tapering to narrow tip, bearing 2-4 rows of short stout spines (Figs. 2, 3a, 3b).

Female.—Macropterous. Length of forewings 7.5 mm; length of body 6.0 mm. Body, appendages and wings similar to male. Seventh sternite very large and expanded, posterior margin extending over and completely covering

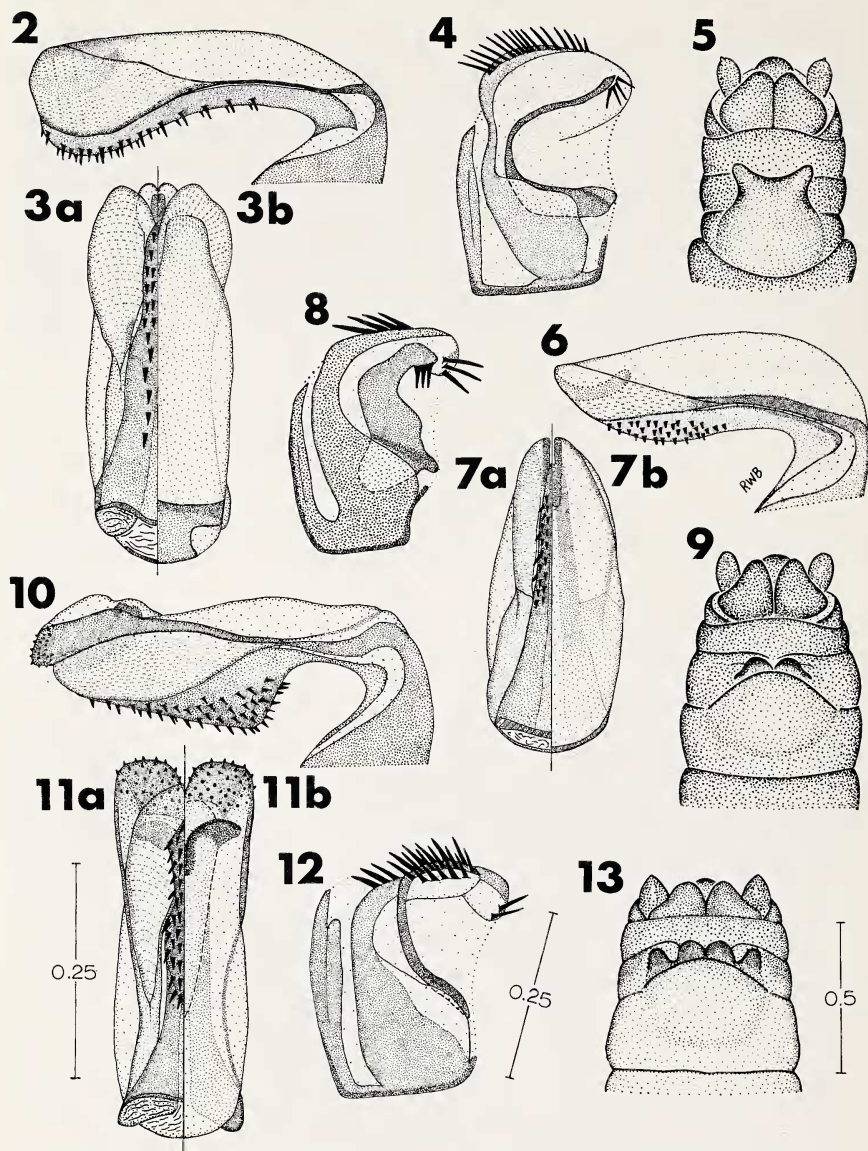
middle of 8th sternite, lateral corners formed into large swollen hornlike projections (Fig. 5). Subgenital plate with median notch and lateral sinuate margins, posterior-lateral margins produced, with narrow sclerotized band.

Types.—HOLOTYPE ♂ and ALLOTYPE ♀, Rucker Creek, above Rucker Lake, Chiricahua Mountains, Cochise Co., Arizona, USA, 18-VII-1968, R. W. Baumann (LACM). PARATYPES: ARIZONA, *Cochise Co.*, same data as holotype, 6 ♂♂ (UU) (RWB); Cave Creek, Herb Martyr Campground, Chiricahua Mountains, 18-VII-1968, R. W. Baumann, 1 ♂ (dissected from mature nymph) (RWB); Upper Cave Creek, Chiricahua Mountains, 17-VIII-1970, K. Clarke and D. Sall, 1 ♂, 1 ♀ (SWRS); Upper Cave Creek, below Cave Creek Falls, 23-VIII-1970, V. Roth, 5 ♂♂, 3 ♀♀ (SWRS) (RWB).



Amphinemura mogollonica

FIGURE 1. *Amphinemura mogollonica*, n. sp., adult male.



FIGURES 2-5. *Amphinemura apache*, n. sp. 2. Epiproct, lateral view. 3a. Epiproct, left half, ventral view. 3b. Epiproct, right half, dorsal view. 4. Paraproct, ventral-lateral view. 5. Female terminalia, ventral view.

FIGURES 6-9. *Amphinemura banksi*, n. sp. 6. Epiproct, lateral view. 7a. Epiproct, left half, ventral view. 7b. Epiproct, right half, dorsal view. 8. Paraproct, ventral-lateral view. 9. Female terminalia, ventral view.

FIGURES 10-13. *Amphinemura mexicana*, n. sp. 10. Epiproct, lateral view. 11a. Epiproct, left half, ventral view. 11b. Epiproct, right half, dorsal view. 12. Paraproct, ventral-lateral view. 13. Female terminalia, ventral view. (Scale in mm).

Distribution.—*Amphinemura apache* has been collected only in the Chiricahua Mountains of Southeastern Arizona. These mountains are known for their interesting endemic fauna and it is possible that this species is restricted to this area. The absence of extensive collections from the American Southwest and Mexico, however, makes such an assumption questionable.

Diagnosis.—The male of *A. apache* has an epiproct which is rectangular and narrow in dorsal view and enlarged apically in lateral view. It can be separated from the similar species, *A. mexicana* and *A. venusta*, by the broadly rounded apical portion of the epiproct as seen in lateral view. The apical portion is distinctly angular in *A. mexicana* and *A. venusta* and is produced into a downward directed process. The female can be distinguished by the greatly expanded seventh abdominal sternite which bears two hornlike processes at the posterior corners. The females of all other known species have a seventh sternite which is only slightly expanded with a broadly rounded posterior margin.

Etymology.—The specific name "apache" is a noun in apposition. It was chosen because of the importance of the Chiricahua Mountains in the history of the Apache Indians.

Amphinemura banksi Baumann and Gaufin, new species

Figures 6-9, 23

Nemoura venusta, Needham and Claassen, 1925: 209 (not holotype), 363, figs. 5-8.

Nemoura (*Amphinemura*) *venusta*, Ricker, 1952: 27 (in part).

Nemoura (*Amphinemura*) *venusta*, Gaufin, Nebeker and Sessions, 1966: 34, 35, 37 (distribution); figs. 62, 63, 72.

Amphinemura venusta, Illies, 1966: 189-190 (in part).

Additional references: *Nemoura venusta*, Dodds and Hisaw, 1925: 382; Claassen, 1931: 124 (in part); Claassen, 1940: 66 (in part); Gaufin, 1955: 117 (in part); Ricker, 1959: 949 (in part); Gaufin 1964: 222 (in part); Baumann and Gaufin, 1971: 106 (in part).

Male.—Macropterous. Length of forewings 5.0-6.0 mm; length of body 5.0-6.0 mm. Body brown; legs yellowish brown, femora dark at tip, tibiae dark at base. Forewings dusky brown with 20-25 clear rounded spots in cells beyond cord, cells between cord and base hyaline, veins brown; hindwings mostly hyaline, brown area in costal space beyond cord. Ninth abdominal tergite produced slightly at median-posterior margin, bearing fringe of small dark spinules. Subgenital plate with broad rounded base, tapering abruptly in anterior third, extending to base of epiproct, tip rounded; lobe at base of 9th sternite four times as long as broad, lateral margins parallel, tip rounded. Paraprocts with three sclerotized processes; inner process fairly broad, bluntly forked at tip, lying alongside and extending slightly beyond tip of subgenital plate; middle process with large broad base, apical portion narrow, tip located

on small membranous knob bearing 3-4 stout spines, anterior sclerotized portion with row of 4-5 stout spines; outer process short, base broad, tapering slightly from angular bend to bluntly rounded tip, bearing 3-5 stout apical spines (Fig. 8). Epiproct fairly large and mostly membranous; dorsal aspect as rounded triangle, rounded tip divided by deep narrow sclerotized slit; lateral aspect quite narrow, width constant throughout, tapering to pointed tip, lateral parallel sclerotized band narrow, dorsal margin of band at base even with ventral margin of epiproct; ventral aspect with narrow sclerotized plate, broad at base, tapering gradually to pointed tip, anterior half bearing triangular patch of short stout spines (Figs. 6, 7a, 7b).

Female.—Macropterous. Length of forewings 6.5-7.5 mm; length of body 6.0-7.5 mm. Body appendages and wings similar to male. Seventh sternite large, posterior portion broadly rounded and lightly sclerotized, extending over anterior half of 8th sternite. Subgenital plate with median notch and rounded lateral sclerotized knob-like projections on posterior margin (Fig. 9). Vagina with characteristic sclerotized pattern; dorsal aspect almost square, base slightly broader, lateral-basal corners as lightly sclerotized triangles covering elongate darkly sclerotized areas, apex composed of two blunt projections which meet at junction of seminal receptacles, projections ending in blunt tips (Fig. 23).

Types.—HOLOTYPE ♂ and ALLOTYPE ♀, Hidden Valley Creek, Rocky Mountain National Park, Larimer Co., Colorado, USA, 5-VIII-1953, A. R. Gaufin (LACM). PARATYPES: ARIZONA, *Apache Co.*, Lukachukai Creek, Wagon Wheel Campground, 7-VIII-1969, R. W. Baumann, 4 ♂♂, 6 ♀♀ (RWB). COLORADO, (Rocky Mountain National Park): *Grand Co.*, Onahu Creek, Hwy. 34, 24-VIII-1967, R. W. Baumann, 1 ♂, 1 ♀ (UU). *Larimer Co.*, Cub Creek, beaver dams, 25-VII-1938, H. H. & J. A. Ross, 1 ♂ (INHS); Glacier Creek, 17-VIII-1940, T. H. Frison & T. H. Frison, Jr., 1 ♀ (INHS); same data as holotype, 10 ♂♂, 16 ♀♀ (UU) (RWB); Hidden Valley Creek, 24-VII-1960, A. R. Gaufin, 1 ♂ (UU); Fall River, Hwy. 34, 24-VII-1960, A. R. Gaufin, 1 ♀; 24-VIII-1967, R. W. Baumann, 1 ♀ (UU); creek, Hwy. 34, near Hidden Valley, 24-VIII-1967, R. W. Baumann, 4 ♂♂, 3 ♀♀ (RWB); Big Thompson River, Moraine Park, 24-VIII-1967, R. W. Baumann, 1 ♂, 2 ♀♀ (UU); Mill Creek, near Glacier Basin, 24-VIII-1967, R. W. Baumann, 2 ♀♀ (UU); Glacier Creek, near Bear Lake, 24-VIII-1967, R. W. Baumann, 1 ♀ (UU). UTAH, *San Juan Co.*, Pack Creek, Pack Creek Campground, 8-VIII-1969, R. W. Baumann, 4 ♂♂, 4 ♀♀ (RWB). WYOMING, *Uinta Co.*, small creek 2 miles east of Bridger, 21-VII-1967, R. W. Baumann, 60 ♂♂, 79 ♀♀ (RWB).

Additional specimens.—COLORADO, numerous specimens were examined from the following counties: *Boulder, Chaffee, El Paso, Gilpin, Grand, Jackson, Larimer, Las Animas, Mineral, Rio Blanco, Routt, Summit* and *Teller* [(MCZ) (USNM) (CU) (UU) (RWB) (INHS) (WER) (CAS).] IDAHO, *Clark Co.*, 2.5 miles northwest of Kilgore, 15-VII-1956, W. F. Barr,

6 ♂♂, 15 ♀♀ (UI). MONTANA, *Gallatin Co.*, Hyalite Creek, 9-VIII-1951, R. Hays and C. J. D. Brown, 1 ♀ (MSU); West Gallatin River, 9-VIII-1951, R. Hays and C. J. D. Brown, 1 ♀ (MSU); Beck and Border Canal, 17-VIII-1951, J. Spindler and W. D. Clothier, 8 ♂♂, 6 ♀♀ (MSU); Allison-Lewis Ditch, 12-IX-1951, J. Spindler and W. D. Clothier, 8 ♂♂, 1 ♀ (MSU). *Glacier Co.*, Kennedy Creek, 4 miles north of Babb, 13-VII-1963, A. R. Gausfin, 1 ♀ (UU). *Judith Basin Co.*, Martin Creek, 10 miles above Geyser, 7-VII-1966, J. R. Grierson, 1 ♂ (UU). SOUTH DAKOTA, *Lawrence Co.*, Roughlock Falls, near Savoy, Black Hills, 21-VIII-1954, M. W. Sanderson, 1 ♂, 3 ♀♀ (INHS). UTAH, records checked from the following counties: *Cache*, *Daggett*, *Duchesne*, *San Juan*, *Summit*, *Uintah*, *Utah* and *Wasatch* [(WER) (INHS) (UU) (RWB) (USU) (CAS).] WYOMING, numerous specimens from the following counties: *Albany*, *Fremont*, *Johnson*, *Lincoln*, *Park*, *Sublette*, *Teton* and *Uinta* [(LACM) (WER) (UU) (CAS) (USNM) (MSU) (INHS) (UCD).]

Distribution.—*Amphinemura banksi* has been recorded from Northern Montana to Northern Arizona and from Idaho to Colorado. Further collecting will probably confirm the presence of this species in Northern New Mexico. A sister species, *A. mogollonica*, is present in Arizona, New Mexico and Southwestern Utah but without an overlap in distributional area.

Diagnosis.—*Amphinemura banksi* is very similar to *A. mogollonica*. The males can be separated by the shorter and broader outer lobe of the paraprocts. The lateral projections of the female subgenital plate are simple and broadly rounded in *A. banksi* where they are bilobed and narrowly rounded in *A. mogollonica*. The female of *A. puebla* is also similar but can be distinguished by the presence of a dark triangular patch over the genital opening.

Remarks.—Needham and Claassen (1925) in their Plecoptera monograph gave descriptions and drawings of a male and female under the name *Nemoura venusta* Banks. They included collection records from Colorado, from which the descriptions and drawings were probably made. These drawings and descriptions did not agree when compared with the type female of *N. venusta* at the Harvard Museum of Comparative Zoology. This left the species figured without a name.

Etymology.—*Amphinemura banksi* was chosen in honor of the late Dr. Nathan Banks, who contributed greatly to the knowledge of the neuropteroid insects of Western North America.

Amphinemura mexicana Baumann, new species

Figures 10-13

Male.—Macropterous. Length of forewings 6.5-7.5 mm; length of body 4.5-6.0 mm. Body brown; legs yellowish brown, femora with 3 dark dorsal stripes, median stripe short, lateral stripes extending length of femur; tibiae dark at base; tarsi blackish. Forewings dark brown with 40-45 clear rounded spots in cells distributed regularly over surface; hindwings uniform dusky

brown, except for 1-2 clear spots in costal space. Ninth abdominal tergite produced slightly at median-posterior margin, bearing a fringe of small dark spinules. Subgenital plate with broad oval base, tapering abruptly in anterior third, extending to base of epiproct, tip broadly rounded; lobe at base of 9th sternite four times as long as broad, lateral margins parallel, tip rounded. Paraprocts with three sclerotized processes; inner process fairly broad, forked at tip, inner prong longer than outer, lying alongside and extending beyond tip of subgenital plate; middle process with large broad base, tapering to long narrow anterior portion, tip situated on small membranous knob bearing 1-2 sharp spines, anterior sclerotized portion with 5-7 stout spines; outer process long and narrow, anterior portion located on broad membranous knob, dorsal aspect of apex bearing rows of 13-17 stout spines (Fig. 12). Epiproct large and mostly membranous; dorsal aspect rectangular, with V-shaped notch at bilobed tip, lobes covered with very small spinules, M-shaped sclerotized internal structure visible directly behind apex; lateral aspect narrow at base and greatly enlarged in anterior two-thirds; greatest width near middle, tip bluntly pointed, lateral sclerotized band narrow, widest at base and apex; ventral aspect with narrow sclerotized median portion, base broad, tapering toward apex, with enlargements near middle and slightly behind tip, bearing large patch of stout spines on anterior two-thirds (Figs. 10, 11a, 11b).

Female.—Macropterous. Length of forewings 8.0-9.0 mm; length of body 6.0-7.5 mm. Body, appendages and wings similar to male. Seventh sternite large, lightly sclerotized, posterior portion broadly rounded, extending over anterior half of eighth sternite. Subgenital plate with median notch, lateral posterior margins with two sclerotized knoblike lobes, both lobes equal in size (Fig. 13).

Types.—HOLOTYPE ♂ and ALLOTYPE ♀, La Marquesa, Las Cruces National Park, Mexico, MEXICO, 5 to 9-VII-1965, Flint and Ortiz (USNM). PARATYPES: FEDERAL DISTRICT, Desierto de los Leones National Park, 30-VII-1939, 1 ♂ (SGJ); III to V-1965, N. L. H. Krauss, 1 ♀; X-1965, 1 ♂, 1 ♀ (USNM). MEXICO, same data as holotype, 6 ♂♂, 10 ♀♀ (USNM); La Marquesa, Las Cruces National Park, 13-VII-1966, Flint and Ortiz, 5 ♂♂, 3 ♀♀ (USNM) (RWB). MORELOS, Lagunas de Zempoala National Park, 18-VIII-1939, 1 ♀ (SGJ); 10 & 11-VII-1965, Flint and Ortiz, 2 ♂♂, 2 ♀♀ (USNM).

Additional specimens.—MICHOACAN, Tuxpan, 8-VII-1965, 6 ♂♂, 4 ♀♀ (ENAM). MORELOS, Xochitepec, 14-VII-1965, 1 ♂, 1 ♀ (ENAM).

Distribution.—*Amphinemura mexicana* is known only from the mountains of Southern Mexico in the vicinity of Mexico City. The known range of this species will probably be greatly expanded with intensive collecting throughout Mexico. Based on present records, this species is the most common *Amphinemura* present in Mexico.

Diagnosis.—This species is most similar to *A. venusta*. The epiproct of the *A. mexicana* male has a large angular ventral projection. The ventral proc-

ess of the epiproct is narrow and pointed in *A. venusta*. Females can be separated by the shape of the sclerotized knobs on the lateral corners of the subgenital plate. In *A. mexicana*, the knobs are equal in size and rounded, while in *A. venusta* the inner lobe is large and broadly rounded and the outer lobe is long and narrow.

Etymology.—The name is derived from Mexico where all specimens have been collected.

Amphinemura mogollonica Baumann and Gaufin, new species

Figures 1, 14-17, 24

Nemoura venusta, Ricker, 1952: 27 (in part); Ricker 1952: 949 (in part); Gaufin, 1964: 22 (in part); Gaufin, Nebeker and Sessions, 1966: 35 (in part).

Amphinemura venusta, Illies, 1966: 189-190 (in part).

Male.—Macropterous. Length of forewings 6.0-7.0 mm; length of body 5.5-6.5 mm. Body brown; legs yellowish brown, femora dark at tip, tibiae dark at base. Forewings dusky brown with 30-35 clear rounded spots in cells distributed regularly over entire surface; hindwings uniform dusky brown except for 1-2 clear spots in the costal space (Fig. 1). Ninth abdominal tergite produced slightly at median-posterior margin, bearing narrow patch of small dark spinules. Subgenital plate with broad rounded base, tapering abruptly in anterior third, extending to base of epiproct, tip rounded; lobe at base of 9th sternite four times as long as broad, lateral margins slightly sinuate, tip rounded. Paraprocts with three sclerotized processes; inner process fairly broad, bluntly forked at tip, lying alongside and extending beyond tip of subgenital plate; middle process with large base, apical portion narrow, tip located on small membranous knob bearing 2-4 sharp spines, anterior sclerotized portion with row of 4-5 stout spines; outer process long, base broad, tapering to narrow anterior portion, tip small and rounded, bearing 2-3 stout apical spines (Fig. 16). Epiproct fairly large and mostly membranous; dorsal aspect as rounded triangle, rounded tip divided by deep narrow sclerotized slit; lateral aspect quite narrow, width constant throughout, tapering to pointed tip, lateral parallel sclerotized band broad at base, dorsal margin of band at base even with dorsal margin of epiproct; ventral aspect with narrow sclerotized plate, broad at base, tapering gradually to pointed tip, anterior two-thirds bearing triangular patch of short stout spines (Figs. 14, 15a, 15b).

Female.—Macropterous. Length of forewings 7.5-8.5 mm; length of body 6.0-8.0 mm. Body, appendages and wings similar to male. Seventh sternite large, posterior portion broadly rounded and lightly sclerotized, extending over anterior half of 8th sternite. Subgenital plate with median notch and bilobed lateral sclerotized projections on posterior margin (Fig. 17). Vagina with characteristic sclerotized pattern; dorsal aspect with broad base and broadly rounded apex, lateral-basal corners as lightly sclerotized triangles

partially covering elongate darkly sclerotized areas, apex with two broad projections, tips rounded above and pointed below, meeting at junction of seminal receptacles (Fig. 24).

Types.—HOLOTYPE ♂ and ALLOTYPE ♀, Christopher Creek, Hwy. 160, Christopher Creek, Gila Co., Arizona, USA, 19-VII-1968, R. W. Baumann (LACM). PARATYPES: ARIZONA, *Apache Co.*, Hall Creek, Hwy. 373, near Greer, 19-VII-1968, R. W. Baumann, 3 ♂♂ (RWB). *Cochise Co.*, stream ¼ mile below Rustler Park spring, Chiricahua Mountains, 27-VIII-1969, R. & D. Koss 1 ♂ (RWB). *Gila Co.*, same data as holotype, 27 ♂♂, 7 ♀♀ (UU) (RWB). *Graham Co.*, Wet Canyon Campground, Graham Mountains, 13-IX-1952, B. Malkin, 1 ♀ (CAS); Shannon Campground, Graham Mountains, 13-IX-1952, B. Malkin, 2 ♂♂, 1 ♀ (CAS). UTAH, *Beaver Co.*, Birch Creek, below Birch Creek Lake, Kents Lake road, 4-VIII-1969, R. W. Baumann, 1 ♂, 1 ♀ (RWB). *Emery Co.*, Joes Valley, 6-IX-1945, G. F. Knowlton, 2 ♀♀ (WER). *Sanpete Co.*, Ephraim Canyon summit, 6-IX-1945, G. F. Knowlton, 2 ♂♂, 3 ♀♀ (WER). *Sevier Co.*, Fish Lake, 2-IX-1930, 1 ♂ (INHS); Seven Mile Creek, above Johnson Valley Reservoir, 24-VIII-1962, R. F. Gauvin, 2 ♀♀ (UU). *Washington Co.*, North Fork Virgin River, Watchman Campground, Zion National Park, 30-VII-1967, R. W. Baumann, 1 ♀ (RWB).

Additional specimens.—ARIZONA, *Apache Co.*, 3.8 miles southeast of Nutrioso, 17-V-1964, S. G. Jewett, Jr., 1 ♂, 2 ♀♀ (dried) (SGJ); Rosey Creek, Hwy. 373, near Greer, 7-IV-1968, R. W. Baumann, 2 ♀♀ (dried) (RWB); 19-V-1970, R. W. Baumann, 1 ♂, 2 ♀♀ (dried) (RWB). NEW MEXICO, *Grant Co.*, Pinos Altos, Pinos Altos Mountains, 28-VIII-1951, E. L. Kessel, 1 ♀ (CAS).

Distribution.—*Amphinemura mogollonica* is the most common *Amphinemura* species in Arizona. It has also been recorded from the Southwestern parts of New Mexico and Utah.

Diagnosis.—This species is similar to *A. banksi* but can be distinguished by the shape of the male paraprocts and the projections on the female subgenital plate. The outer lobe of the paraproct is long and thin in *A. mogollonica*



FIGURES 14-17. *Amphinemura mogollonica*, n. sp. 14. Epiproct, lateral view. 15a. Epiproct, left half, ventral view. 15b. Epiproct, right half, dorsal view. 16. Paraproct, ventral-lateral view. 17. Female terminalia, ventral view.

FIGURES 18-21. *Amphinemura venusta* (Banks). 18. Epiproct, lateral view. 19a. Epiproct, left half, ventral view. 19b. Epiproct, right half, dorsal view. 20. Paraproct, ventral-lateral view. 21. Female terminalia, ventral view.

FIGURE 22. *Amphinemura puebla*, n. sp., Female terminalia, ventral view.

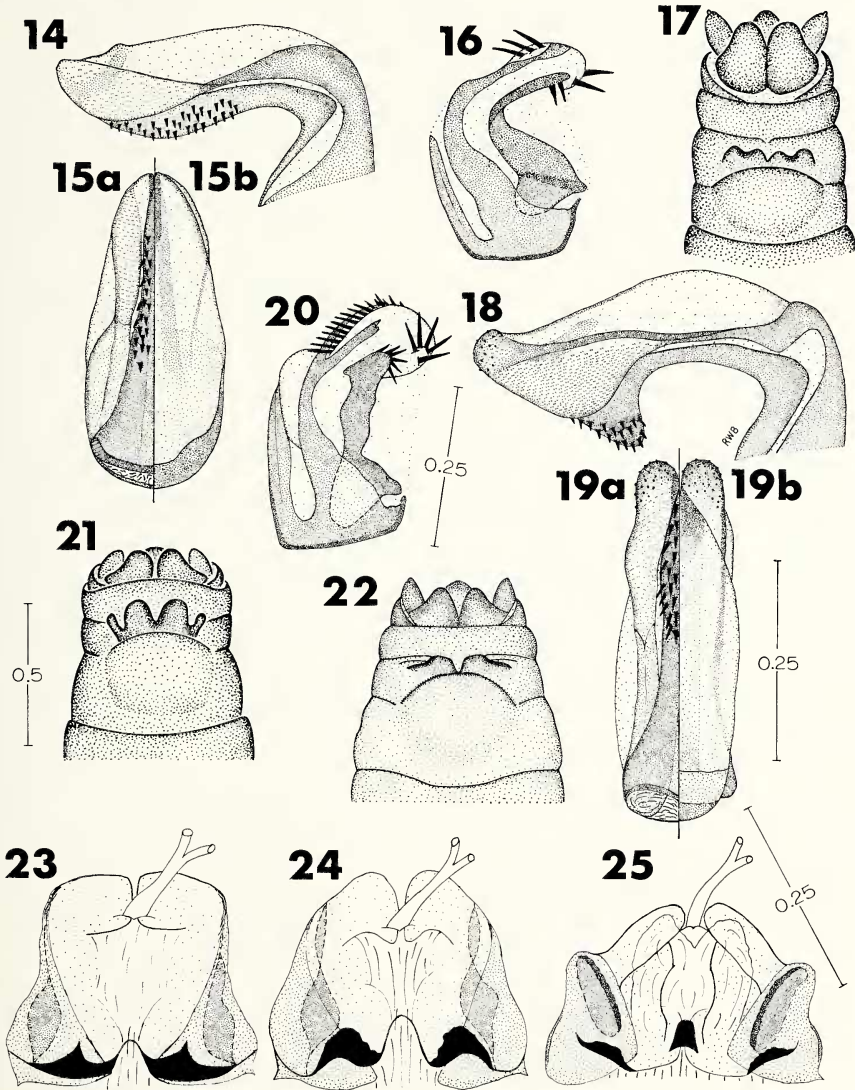
FIGURE 23. *Amphinemura banksi*, n. sp., Vagina, dorsal view.

FIGURE 24. *Amphinemura mogollonica*, n. sp., Vagina, dorsal view.

FIGURE 25. *Amphinemura puebla*, n. sp., Vagina, dorsal view. (Scale in mm).

and short and blunt in *A. banksi*. The *A. mogollonica* female has bilobed projections and the *A. banksi* female has single lobed projections. Some variation exists in the size of the outer lobe in *A. mogollonica* but usually both lobes are of similar size.

Etymology.—The name “mogollonica” is taken from the Mogollon Rim of Arizona.



Amphinemura puebla Baumann, new species

Figures 22, 25

Male.—Unknown.

Female.—Macropterous. Length of forewings 7.0-8.5 mm; length of body 6.0-6.5 mm. Body brown; legs yellowish brown, femora dark at tip, tibiae dark at base and tip, tarsi dark. Forewings dusky brown, with 25-30 clear rounded spots in cells distributed regularly over surface; hindwings uniform dusky brown. Seventh sternite large, posterior portion rounded and lightly sclerotized, extending over anterior half of 8th sternite. Subgenital plate with deep median notch and blunt lateral sclerotized projections on posterior margin (Fig. 22). Eighth sternite with elongate triangular sclerotized patch over genital opening. Vagina with characteristic sclerotized pattern; dorsal aspect short and wide, base broad, apex very broadly rounded, lateral basal corners as small sclerotized triangles covering elongate oval darkly sclerotized areas, apex with two narrow projections, tips rounded, meeting at junction of seminal receptacles (Fig. 25).

Types.—HOLOTYPE ♀, 5.2 miles west of Acultzingo (Veracruz), Puebla, MEXICO, 6-VII-1962, J. M. Campbell (INHS). PARATYPES: PUEBLA, same data as holotype, 2 ♀♀ (INHS) (RWB).

Distribution.—*Amphinemura puebla* is known only from the three type females from Puebla, Mexico.

Diagnosis.—This species is similar in the female to *A. banksi* and *A. mogollonica*. The shape of the lobes of the subgenital plate is somewhat more angular in *A. puebla* but falls within the range of variation found in the above species. The vagina is, however, quite distinctive and can be recognized by the ratio of width to length. In *A. puebla*, the width is nearly twice the length while in *A. banksi* and *A. mogollonica* the width and length are about equal. The prolonged lobes which meet at the junction of the seminal receptacles are narrow and of equal length throughout in *A. puebla* while in *A. banksi* and *A. mogollonica* they are enlarged apically.

Etymology.—The name "puebla" is taken from the Mexican state where the types were collected.

Amphinemura venusta (Banks)

Figures 18-21

Nemoura venusta Banks, 1911: 337.

Nemoura venusta, Needham and Claassen, 1925: 209 (holotype only).

Nemoura (*Amphinemura*) *venusta*, Ricker, 1952: 27 (in part).

Amphinemura venusta, Illies, 1966: 189-190 (in part).

Additional references: *Nemoura venusta*: Claassen, 1940: 66 (in part); Ricker, 1963: 949 (in part); Ricker, 1950: 205; Gaufin, 1964: 222 (in part).

Male.—Macropterous. Length of forewings 6.5-7.0 mm; length of body 5.0-5.5 mm. Body brown; legs yellowish brown, femora dark at tip, tibiae dark at base and tip, tarsi black. Forewings deep brown, with 35-40 clear rounded spots in cells distributed regularly over surface; hindwings uniform dusky brown, except for 1-2 clear areas in costal space. Ninth abdominal tergite produced slightly at median-posterior margin, bearing sparse fringe of small dark hairs, lateral-posterior margins with 2-3 long black hairs. Subgenital plate with broad oval base, tapering abruptly in anterior third, extending nearly to base of epiproct, tip broadly rounded; lobe at base of 9th sternite four times as long as broad, lateral margins parallel, tip rounded. Paraprocts with three sclerotized processes; inner process fairly broad, with slight indentation at blunt tip, lying alongside and extending beyond tip of subgenital plate; middle process broad at base, tapering abruptly to narrow median portion, tip forked and situated on large membranous bulbous lobe bearing 3-7 sharp spines, anterior sclerotized portion with row of 12-15 stout spines; outer process fairly long, broad at base, tapering slightly towards apex, with 6-9 stout spines on blunt tip (Fig. 20). Epiproct large and mostly membranous; dorsal aspect rectangular, deep sclerotized slit at bilobed tip, lobes bearing few very small dark spinules; lateral aspect narrow at base, tapering abruptly to slanted angular apex, with large median-ventral projection, lateral sclerotized band broad at base and tip, narrow medially; ventral aspect with narrow sclerotized portion, base broad, tapering towards apex, slight enlargement at anterior third, enlarged area bearing patch of short stout spines (Figs. 18, 19a, 19b).

Female.—Macropterous. Length of forewings 7.5-9.0 mm; length of body 6.0-8.0 mm. Body appendages and wings similar to male. Seventh sternite fairly large, lightly sclerotized, broadly rounded and extending over half of 8th sternite. Subgenital plate with deep median notch, two lateral knoblike projections on posterior margins, inner projections large and broadly rounded, outer projections long and very narrow (Fig. 21).

Types.—HOLOTYPE ♀, Huachuca Mountains, Cochise or Santa Cruz Co., Arizona, USA, Oslar (MCZ, #11357). ALLOTYPE ♂, La Marquesa, Las Cruces National Park, Mexico, MEXICO, 5 to 9-VII-1965, Flint and Ortiz (USNM).

Additional specimens.—FEDERAL DISTRICT, St. Rosa Nr., 24-I-1932, A. Dampf, 1 ♂ (INHS); Canada Contraras, 14-VI-1947, T. H. Hubbell, 1 ♂, 1 ♀ (WER). MEXICO, La Marquesa, Las Cruces National Park, 5 to 9-VII-1965, Flint and Ortiz, 1 ♂, 2 ♀ ♀ (USNM). MICHOACAN, Tuxpan, 7-VIII-1965, 2 ♀ ♀ (ENAM).

Distribution.—*Amphinemura venusta* is known from the United States by a single record from Southern Arizona (type). The species is recorded from three Mexican states in the vicinity of Mexico City. The distribution patterns of Trichoptera species (Flint, 1967) indicate that further collections in Northern Mexico should fill this distribution gap.

Diagnosis.—The males of this species are easily recognized by the details of the epiproct and the distinctive bulbous paraprocts. The epiproct of the most similar species, *A. mexicana*, has a wide angular ventral projection while the epiproct of *A. venusta* is narrow and pointed. *Amphinemura venusta* is the only species in this complex which has large membranous enlargements at the tip of the middle lobe of the paraprocts. The females are similar to *A. mexicana* but can be distinguished by the thin outer lobes on the median-posterior margins of the subgenital plate. These lobes are short and broad in *A. mexicana*.

Remarks.—*Amphinemura venusta* was named by Nathan Banks from a single pinned female. The apparent lack of close examination of the type by Needham and Claassen and the very general key character by Ricker (1952) led to the consideration of all specimens of *Amphinemura* from Western North America with "windowed" wings under this name.

KEY TO SPECIES

Males

(*puebla* unknown)

1. Dorsal aspect of epiproct with broad base and narrow apex; lateral aspect of epiproct of equal width throughout length; paraprocts bearing 14 or less spines. 2
 Dorsal aspect of epiproct with broad base and apex; lateral aspect of epiproct with narrow base and enlarged apex; paraprocts with 18 or more spines. 3
2. Outer sclerotized process of paraprocts short, broad and blunt at tip (Fig. 8). *banksi*
 Outer sclerotized process of paraprocts long, narrow and pointed at tip (Fig. 16). *mogollonica*
3. Lateral aspect of epiproct broadly rounded at apex, without definite ventral projection (Fig. 2). *apache*
 Lateral aspect of epiproct angular at apex, with definite ventral projection. 4
4. Ventral projection at apex of epiproct narrow and pointed; middle sclerotized process of paraprocts located on large bulbous membranous lobe, outer sclerotized process broad with large tip (Figs. 18, 20) . . . *venusta*
 Ventral projection at apex of epiproct broad and angular; middle sclerotized process of paraprocts located on small narrow membranous lobe, outer sclerotized process narrow with small tip (Figs. 10, 12). . . *mexicana*

Females

1. Produced portion of 7th abdominal sternite bluntly forked completely covering 8th sternite (Fig. 5). *apache*
 Produced portion of 7th abdominal sternite broadly rounded, partially covering 8th sternite. 2

2. Posterior-lateral margin of subgenital plate with one sclerotized projection on each side (bilobed in *mogollonica*). 3
Posterior-lateral margins of subgenital plate with two sclerotized projections on each side. 5
3. Projections on subgenital plate with bilobed tip, lobes of about equal size (Fig. 17). *mogollonica*
Projections on subgenital plate rounded or slightly angular, sometimes with small lateral extensions. 4
4. Vagina rectangular with broad base, lateral triangles small and dark, anterior projections narrow and rounded at tip; triangular sclerotized patch on 8th sternite over genital opening; projections on subgenital plate angular (Figs. 22, 25). *puebla*
Vagina square with broad base and apex, lateral triangles large and light, anterior projections wide and blunt at tip; sclerotized patch absent from 8th sternite; projections on subgenital plate rounded (Figs. 9, 23). *banksi*
5. Outer subgenital plate projections equal in size or slightly smaller than inner projections (Fig. 13). *mexicana*
Outer subgenital plate projections very narrow, inner projections large (Fig. 21). *venusta*

RESUMEN

El complejo *Amphinemura venusta* del oeste norteamericano muestra contener seis especies conocidas de las cuales sólo una fué previamente identificada. La comparación del holotipo hembra de *Amphinemura venusta* (Banks) con los ejemplares disponibles lleva a la radiagnosis de ésta especie en México, siendo la localidad típica en la parte sur de Arizona el límite boreal de su distribución. Se describen dos especies *A. mexicana* y *A. puebla* de las cercanías de la ciudad de México. Los especímenes de las Rocalloses llamados *A. venusta* (Banks) como resultado de la monografía de Needham y Claassen (1925) son llamados *A. banksi*. Dos especies llamadas *A. apache* y *A. mogollonica* provienen del Sudoeste de los Estados Unidos.

Las especies del complejo están aparentemente restringidas a corrientes permanentes de agua. En los Estados Unidos, el período de vuelo es corto, extendiéndose desde julio a septiembre. Los datos disponibles sobre especies mexicanas indican que el período de emergencia es prolongado y puede extenderse durante todo el año.

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